



```
%  
% model for current outut of HPD preamp into QIE  
%  
function[nt] = dghpdppls(nbin,E,ts,top,thpd,tpre)  
%  
% number of 1 nsec bins - nbin  
% energy E - 10 pe/GeV  
% scint decay time ts  
% optics +jitter" top  
% HPD hole drift time thpd  
% preamp RC-CR shaping time tpre  
%  
% shape in 1 nsec bins - nbin of  
nt = zeros(nbin,1);  
%  
% HPD drift shape approxmated by triangle - approx 120 V, 200 um  
% bias gives step to I, drift in thpd to 2I.  
%  
for j = 1:thpd  
    nth(j) = 1.0 + j ./thpd;  
end  
%  
% set integrated current out of HPD = 1  
%  
nth = nth ./(thpd .*1.5);  
%  
% use preamp with Binkley shape, out 4 time constants  
%  
ntp(1) = 0.0;  
for j = 1:4.0 .*tpre  
    ntp(j) = j .*exp(-(j .*j) ./(tpre .*tpre));  
end;  
intg = sum(ntp);  
if intg > 0.1  
    ntp = ntp ./intg;  
end;  
%  
%  
% first the statistics of the light output/photoelectrons  
% stochastic is 100%/sqrt(E), so assume 10 pe/GeV in HB  
%  
npe = 10 .*E;  
%  
[n,dum] = dggaus(npe,0.,sqrt(npe));  
%  
% energy deposited in scint, effective tile + WLS decay time = ts  
% t = 0 is particle passage  
%  
for i = 1:n  
    t1(i) = ts .*dgexp(1.0,0.,10.);  
%  
% slop due to differing optical path length from scint to HPD- storage in WLS too
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%  
t2(i) = t1(i) + top .*rand;  
%  
% no jitter due to HPD cathode or transit time as that is<0.2 ns  
%  
% add in the current of the HPD output, thpd defined  
%  
for j = 1:thpd  
t3(j) = t2(i) + j;  
%  
% for each current bin round over by the preamp RT and FT  
%  
for k = 1:length(ntp)  
t4(k) = t3(j) + k;  
%  
% take 1 nsec bins, nbin of  
%  
if t4(k) < nbin  
ntb = ceil(t4(k));  
nt(ntb,1) = nt(ntb,1) + nth(j) .*ntp(k);  
end;  
end;  
end;  
end;  
%  
end  
%
```